LINDA ABBLITT

SAMARIUM

Element Symbol: Sm
Atomic Number: 62

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The discovery of samarium is somewhat under dispute, with a number of claims having been made in the late 1800s for the lanthanide metals that are often found together in mineral deposits. Widely accepted as the discoverer of samarium is the French chemist Paul Émile Lecoq de Boisbaudran (1838-1912), who isolated the oxide and/or hydroxide from the mineral samarskite in 1879 and showed it to be comprised of a new element on the basis of its optical spectroscopy. Earlier claims were demonstrated to be mixtures of a number of related elements, including samarium. The lanthanide metals are often found in variable ratios of a number of the elements, the mixtures being known as mischmetal, and the purification remained problematic until the development of adequate ion exchange and solvent extraction methods.

Samarium (initially called samaria) was the first element to be named after a person. This occurred indirectly in relation to Vasili Samarsky-Bykhovets (1803–1870), after whom the mineral samarskite was named. Samarsky-Bykhovets had given access to the German mineralogists who discovered the mineral in the Urals.

Samarium is one of the lanthanide metals, also termed rare earth elements. Like most of this series, the latter term is a misnomer as the element is the 40th most common element in the earth's crust, making it more common than tin, for example. Bastnäsite and monazite are the common commercial sources of samarium.

Samarium has four stable isotopes, ^{144}Sm, ^{150}Sm, ^{152}Sm and ^{154}Sm, and three long-lived radioisotopes with half lives in excess of the age of the Earth, ^{147}Sm, ^{148}Sm and ^{149}Sm.

Samarium-cobalt magnets are a main use of samarium. Whilst not having as high a permanent magnetisation as neodymium alloy magnets, they are less susceptible to demagnetisation and are more stable to higher temperatures. A range of industrial applications have been developed in catalyst and chemical reagent fields, including decomposition of pollutants and waste product polymers. Samarium triflate is a well-used Lewis acid. In addition to displaying characteristic trivalent ion chemistry typical of lanthanide metals, the electronic structure of samarium is such that the divalent ion is accessible. A number of ionic and organometallic samarium(II) complexes are known and have found important applications as selective reducing agents. Flint igniters in many lighters and contain samarium, as a component of mischmetal. As ligated complexes, the radioactive isotope ^{153}Sm is used as a lung, prostate and breast cancer treatment.

Samarium is not found naturally in its elemental form due to its high reactivity. It has no known role in living organisms. Its insoluble salts are non-toxic and the soluble salts are only slightly toxic.

Provided by the element sponsor Michael Gardiner

ARTISTS DESCRIPTION

I looked at the current uses of samarium, and one of the major ones seemed to be in the manufacture of magnets. I read that it quickly oxidises in air, and the word oxidise made me think of the colour of rust. As I was researching this element I came across a picture of a pile of small curved samarium-cobalt magnets. I took the idea of these curved magnets and designed a wood cut which I printed in rust.

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